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# Air pollution online: everyday environmental information on the social media site Sina Weibo

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## Abstract

**Purpose** – The purpose of this paper is to explore how information on air pollution is shaped online on an everyday basis, with a particular emphasis on digital devices and digital representations as constitutive of environmental information practices. Furthermore, this research highlights an understudied aspect of air pollution – the digital flow of multimodal representations that citizens encounter and produce in their everyday life.

**Design/methodology/approach** – The information gathering was carried out on an everyday basis during February–March 2017. The study is based on 403 microblog posts from the social media site Sina Weibo, and netnographic fieldwork, including the observation of news, advertisements, and diary writing. The collected data were mapped in clusters based on the interrelations of objects, agents, and activities, and analyzed in depth using qualitative multimodal analysis.

**Findings** – Information enacted through specific socio-materialist configurations depicts air pollution as self-contained and separated from human action. Air quality apps are central in connecting a wider nexus of representations and promoting such perceptions, illustrating the role of digital devices in an everyday information context.

**Social implications** – The study reveals a schism between Chinese political environmental visions and everyday environmental information practices, which raises questions of how the battle against air pollution can be sustained in the long term.

**Originality/value** – This study suggests that digital material aspects – inbuilt applications of digital devices and digital representations of objects – are interrelated with physical experiences of air pollution, and thus constitute elements of practice in their own right.

**Keywords** China, Social media, Air pollution, Microblogging, Digital materiality, Everyday information practices, Microblogs

**Paper type** Research paper

## Introduction

This paper examines information about air pollution on the Chinese social media site Sina Weibo from the perspectives of the practice theory (Schatzki, 2001a, b) and socio-material theory (e.g. Scott and Orlikowski, 2012). Attention is paid to the constitutive entanglement of social and material aspects in how information about air pollution is shaped, in particular for understanding the digital materiality of objects such as digital devices and digital representations of physical objects related to air pollution. It aims to: explore how a certain type of environmental information is shaped in tandem with social practices, focusing in particular on digital devices and tools, digital representations of objects, and activities and experiences as part of a complex network of information providers that people encounter in their daily lives; and illustrate the role of social media as everyday information sites which Chinese citizens engage in and contribute to in their everyday lives.

Research on environmentally relevant information practices has stressed the centrality of socio-material relations in shaping environmental awareness and environmental behavior (Haider, 2011, 2016; Hobson, 2006; Nathan, 2012). It is suggested that objects mediate public participation in environmental matters and solicit practices by their material presence, while articulating a representation of a certain ethic (Hobson, 2006; Marres, 2012).



Furthermore, mundane objects are seen to materialize environmental concerns; items, such as cars and recycling bins, can function as trigger objects that invite people to think of environmental issues that are otherwise often abstract and invisible, for example, sustainability (Haider, 2011). Recent information practice research also explores how environmentally relevant everyday life practices play out online, and illustrates how digital practices contribute to forming information about the environment and eco-friendly lifestyles (Haider, 2016). Given the ubiquity of digital devices in contemporary society, it is safe to say that the materiality of information in online settings has implications for how information is shaped in social practices offline. This is also the case for practices that are considered to have a bearing on environmental issues.

In China, environmental concerns are manifold, but air pollution, in particular, attracts a lot of attention. Given that 20 of the top 30 most polluted cities in the world are located in China (Shapiro, 2016, p. 7), and lung cancer is on the rise (Scutti, 2016), this interest is understandable. The deteriorated air quality is accompanied by the soaring sales of objects related to air pollution, such as air purifiers, facemasks, air tonics, PM2.5 measure devices, or air quality apps (Fullerton, 2016). The Chinese local environmental bureaus update the air quality measurements daily, and advertisements for various air-related items appear in the media. These objects are physically part of people's everyday life and also figure on social media. Thus, environmental threats are strongly anchored in mundane everyday life settings and many of these settings are, in turn, saturated by use and presence of various digital devices and online communication tools. This makes everyday flows on social media an interesting starting point for an investigation, as they can provide an insight into citizens' behaviors and perceptions in the face of environmental threats. As such, this research contributes to the field of socio-materialist relations by exploring digital aspects of objects, both as representations on social media and as digital objects in their own right – henceforth referred to as digital materiality.

The study is guided by the following broad research questions:

- RQ1. Which elements are central in representing air pollution in Chinese social media, in which contexts do they appear, and what type of social practices are they constitutive of?
- RQ2. In which ways are digital objects and social media information practices connected to air pollution, and which understandings of air pollution are they seen to advance?

### **Elements of practices and everyday information: the practice and socio-material theory**

Information research drawing on a practice theory approach emphasizes the embedded character of information, as it is sustained and produced in specific settings and by and through certain social practices (Savolainen, 2007, pp. 120-123; Cox, 2012; Shove *et al.*, 2012). For instance, Anne-Marie Lloyd's (2009) study of work-related practices among ambulance drivers shows how everyday routines shape how work-related information is generated. Practices are understood to consist of elements; that is, objects, human actors, activities, emotions, language, or events can all be elements of practices (Schatzki, 2001a, pp. 10-13), and the arrangements of different sets of elements, in turn, form practices (Shove *et al.*, 2012). Conceptualizing practices in this way allows different elements to take prominence. This study of information on air pollution in Chinese social media uses material aspects and the configurations they enter with other elements as its focal point of analysis. Information is in this sense seen as interwoven with everyday practices, and the use of social media often constitutes an element in such practices.

While workplaces constitute one field that has often been in focus in studies of information practices, as they tend to provide delineable settings for defining context

(see Lloyd, 2009; Sundin and Johannisson, 2007; Veinot, 2007), the domain of the everyday is – understandably – less studied. However, such a setting can provide valuable insights within a practice theory framework and in particular concerning environmental issues, which are often connected to practices carried out in the home or during leisure time (Haider, 2011; Hobson, 2006; Nathan, 2012). For instance, Haider (2011, 2016) illustrates in two separate studies how environmental awareness is shaped by everyday practices such as recycling, purchase of ecological food, and the practice of blogging, and how this produces certain types of information on the environment and environmental problems.

Similar to practice theory, a socio-materialist perspective highlights the entanglement of the social and material world and the production of knowledge that is enacted through specific socio-materialist configurations (Scott and Orlikowski, 2012, p. 117). Scott and Orlikowski (2012) emphasize that materially mediated social engagement is particularly evident in contemporary society through social media, which are based on the user-material interaction. Apart from enabling a direct socio-materialist interaction, social media can also be used to transport other elements across time and/or space, which is crucial in creating the possibility for the establishment of practices elsewhere (Shove and Spurling, 2013, p. 6; Shove *et al.*, 2012, pp. 44-45). Shove *et al.* (2012) highlight that transportation of elements primarily involves two specific elements – emotions and ideas – as objects are transported physically (pp. 53-56). However, as stressed in the introduction, objects are not just physical; they can also be seen to comprise a digital materiality. An air quality app in a smartphone is one example of a digital “object,” whose circulation social media sites facilitate. Also physical objects, such as a facemask, can be transported as a digital representation. Its representational usage and the ideas it conveys have implications for how users see and use the physical object. Thus, by considering a wider variety of elements related to air pollution, including digital material aspects, a deeper understanding of arrangements of elements and the information about air pollution that they provide can be acquired.

### **Background: air pollution and information in a Chinese context**

Everyday aspects of information are particularly interesting in the light of the Chinese government’s attempts to battle air pollution and raise ecological awareness. The deteriorated air quality has prompted the Chinese authorities to respond with several measures. The dissemination of information about air pollution, an issue that earlier was contested, is now encouraged by the authorities and promoted in different ways (Shapiro, 2016). The Chinese government has installed air monitoring devices in cities (MEP, 2012), and a new environmental law gives citizens the legal right to obtain governmental information about environmental issues (Hilton, 2013, p. 9). In addition, environmental NGOs and media outlets occasionally initiate information campaigns in a bid to raise awareness (Boyd, 2013; Yang and Calhoun, 2013). The most publicized case concerned a film produced by a freelance journalist about air pollution, which aired on the social media sites Tencent and YouKu (Shapiro, 2016, p. 129). Although the Chinese government approaches environmental issues by downstream policy implementation and information dissemination (Gilley, 2012), public participation in environmental issues (within the state-sanctioned limits) and individual responsibility are encouraged (Gilley, 2012; UNEP, 2016). A number of educational programs have been initiated to improve ecological awareness, alongside stricter regulations concerning emissions for polluting entities (Gilley, 2012; UNEP, 2016).

Studies of environmental information on pollution in China tend to focus on major information sources and on dominant actors, namely, organizations or official information channels (see de Burgh and Rong, 2011; Ma, 2015a; Zhang and Barr, 2013), and only a few studies explore the perceptions of private actors and related environmental communication. In the wake of the government’s ecological ambitions, one focal issue concerns public

commitment to engage in environmental issues and communication. A questionnaire-based study reveals that citizens are willing to engage in pro-environmental behavior and communication

(Jiang *et al.*, 2017), but environmental information, as embedded in citizens' daily experiences, activities, and interactions, has been neglected. Ethnographic studies tend to focus on pollution in remote villages (Lora-Wainwright *et al.*, 2012; Tilt, 2013), to the neglect of urban experiences and online representations which also constitute everyday aspects of pollution. Social media in China provide citizens with forums for discussions and communication of daily activities, intertwined with the physical world. Citizens frequently use social media, and in particular microblogging sites, to share their everyday life, communicate with friends, or browse through the flows of updates (Liu, 2011; Wallis and Xi, 2017). As it becomes increasingly difficult and meaningless to distinguish between life online and offline (boyd, 2008; Pink, 2012), air pollution is not just a physical phenomenon, but it is also shaped by how it is imagined online. Chinese citizens encounter air pollution daily, and studies of information as socio-material can deepen understandings of people's perception and reaction to air pollution. This research highlights a particular configuration of socio-materialist relations centered on two digital devices – air quality apps and weather apps, alongside digital representations of facemasks, the near iconic physical object that has come to illustrate the severity of the problem.

#### *Sina Weibo: an open forum and a controlled site*

Technical design, social norms of online behavior, and political restrictions are issues which may influence the use of social media (Graf, 2016), and thereby the representations of elements circulating online. This study is based on material from the Chinese microblog site Sina Weibo – often described as a mix between Twitter and Facebook – to investigate users' representations of air pollution. Sina Weibo, a private company, is one of the largest social media providers in China with an estimated 300 million users (Creemers, 2016; Hatton, 2015). It is used by established media, government bureaus, and companies to publicize their latest news, but it is also a site where microbloggers share information, profess opinions, and describe their daily life (Liu, 2011, pp. 2-4). The microblog environment is characterized by a convergence of media types and variously positioned actors, along with a mixture of the private and the public. Sina Weibo's advantage as field site rests on its construction as an open forum where microbloggers can take part in conversations without prior acquaintance (Hatton, 2015). The technical design encourages the use of images and short messages (Goodwin, 2014), and the site is largely used by a young urban population, whose preferences and behaviors it reflects (Goodwin, 2014; Liu, 2011)[1]. Listed topics and search functions enable users to navigate the site, but the exact principles behind the ranking of posts are unknown. Academic research on how Chinese search engines index their pages is scarce (Jiang, 2014), but search engine optimization consultants have analyzed the ranking of Sina Weibo for marketing purposes (Kun, 2017). Their conclusion agrees with the observations of this study – the highest ranked posts are based on generated likes, shares, and comments, to be followed by the latest posted tweet on the relevant search term (Kun, 2017). Aside from technical and social conditions, Sina Weibo is subject to political control manifested by access problems and/or judicial punishment for politically inappropriate content. Chinese internet control has been analyzed in a comprehensive body of scholarly work (deLisle *et al.*, 2016; Esarey and Kluver, 2014; Yang, 2008; Zheng, 2008), and it is maintained that social media users have developed inventive ways of expressing themselves and abstain from mentioning sensitive issues openly (deLisle *et al.*, 2016; Esarey and Kluver, 2014; Yang, 2008; Zheng, 2008). As the overall rationale behind internet control is the prevention of so-called mass incidents and large-scale protests, subjects that are not censored may still become sensitive depending on public reception.

Air pollution is not a sensitive subject. On the contrary, the government is encouraging environmental awareness and environmental education, and the state aims to create an “eco-civilization,” inhabited by ecologically sensitized citizens (Ma, 2015b; UNEP, 2016). Yet, it has the potential to become controversial depending on the content of the post, the generated likes, and numbers of shares. This does not, however, diminish the importance of the site as an everyday information provider. Despite inbuilt restrictions, microbloggers are the co-producers of information on air pollution, and the flows on Sina Weibo arguably constitute a space where Chinese citizens encounter ideas and representations of air pollution.

### Material collection and methods

The material analyzed for this study consists of 403 individual posts collected from Sina Weibo, together with screenshots and field notes. The material collection was inspired by a variety of netnographic practices (Kozinets, 2015), including observation of news and advertisements, and fieldwork diary writing. The collection of material was based on everyday immersion on Sina Weibo during February-March 2017. The study draws inspiration from Pink’s view of digital representations as an everyday flow that users move through and experience in their everyday life. As such, they form an aspect of everyday life that may inform opinions and ideas (Pink, 2012, p. 34).

Sina Weibo is constructed as a flow – updates, hot topics, and the latest posts meet the users. By approaching the way microbloggers themselves engage with the site, the researcher can emulate the conditions of everyday information encounters. Although digital flows may look different for different users[2], a systematic inquiry that stretches over months can allow patterns in content and expressions to emerge. Due to censorship issues, an everyday collection strategy could potentially generate more critical posts, as newly posted tweets may not yet have come to the attention of the authorities. In order to get a better understanding of the types of posts likely to be found and thus to situate the analyzed material, an archival search resulting in 102 posts was also carried out. This allowed us also to check for potential bias. The comparison illustrated no differences in terms of content – there were critical posts in both the archival posts and the posts collected ethnographically. Given the political situation in China, great care was taken while collecting and presenting the material, following the ethical considerations outlined by Association of Internet Researchers (AoIR, 2012), in particular in order to ensure confidentiality. Quotes that appear in the paper have been translated from Chinese into English by the first author, who is proficient in Mandarin. Translation also has the advantage of anonymizing the quoted microbloggers, since it is virtually impossible to translate the quotes back into Chinese in exactly the same way.

Sina Weibo’s search function was used to search for microblog posts. *Kongqi wuran* (air pollution), and *wumai* (smog/fog) were used as search terms. *Wumai* was the preferred word to talk about air pollution among microbloggers, and it makes up two thirds of the gathered material. Yet, the preference for *wumai* was merely linguistic. The two search terms did not differ in content, and they were analyzed together. Since filters for individual accounts are not available, advertisements, and news on the search term also appeared in the feed, creating a rich and diverse flow. The ten latest posted tweets from private microblog accounts were collected. If the daily search generated less than ten posts, all were collected. To establish whether the account was public or private, the first author manually checked the account and decided on a case-by-case basis.

For detailed analysis of the data multimodal narrative analysis – a method which sees both text and images as narrative elements (Björkvall, 2009) – proved helpful to probe the content of the microblog posts, as they invariably consisted of images, emojis, and text. Lucy Suchman’s (2012) concept “configuration” – compositions of objects, activities, and

understandings that influence perceptions of an issue – was used as an analytical tool to discern recurring patterns and clusters in the collected data. In practice, this meant that every tweet was coded by what kind of object, activity, and understanding it expressed, and after looking at a large number of tweets, the common congregations of elements appeared, which guided the analysis.

### **Analysis: everyday information on Sina Weibo**

Through the daily exposure to flows on Sina Weibo, it became evident that microblogs responded to media debates and weather conditions in real time, a type of communication which can be attributed to the social and technical conditions of the media site itself and its mesh of actors and newsfeeds. Not a day passed without posts on air pollution, but the intensity depended on the air quality. By paying attention to the specific configurations, a post actualized a number of distinct clusters of interconnected elements. The analysis presents the most common clusters of interrelated elements which make up the primary mode of communicating about air pollution on Sina Weibo. Two objects in particular – air quality smartphone applications and facemasks – constitute central elements that connect other air pollution-related elements. They are therefore used as starting points in the analysis. The first part of the analysis focuses on air quality apps, embedded information infrastructures, and activities related to avoiding air pollution. The second part of the analysis concerns weather apps and central actors in the battle to disperse pollution. A discussion of the facemask as an object of protection and contention follows, as interrelated activities and meaning constructions invariably change the status of the facemask. The analysis ends with a discussion of what the representations on Sina Weibo can tell about human environmental relations and about Sina Weibo's role in generating everyday information.

#### *Air quality smartphone applications and embedded information structures*

Communication about air pollution is manifold, but a prominent aspect of microblogging about air pollution concerns the frequent use of numbers. For instance, a man from Hubei writes: “262, the throat feels weird [...]” Hundreds of kilometers away, a microblogger from Shanghai notes that the “air” is over 200. In Xian, a woman is startled: “The smog today is over 400!” Over the course of two months, microbloggers frequently posted short messages consisting of numbers and sometimes location: “Zhengzhou 299, Baoding 433, Changsha 310, Qingdao 175, Beijing 267, Hangzhou 225.” The numbers appear crucial in communication of air pollution, and they can be traced to the popularity and usage of air quality apps – what the numbers convey is part of an information structure related to these air quality apps. Knowledge, policies, and practices are implied in objects (Shove *et al.*, 2007), and the air quality apps are part of a larger political and scientific knowledge system that determines the parameters of what constitutes air quality.

The air quality apps announce a so-called air quality index (AQI) value, a number indicating the level of hazardous air. This numerical information derives from air quality measurements in urban areas conducted by municipal environmental protection bureaus [3] and by the American consulates[4] (Rohde and Muller, 2015). Air is measured with attention to four specific gases (carbon monoxide, ozone, sulfur dioxide, and nitrogen dioxide) and two particles (PM2.5 and PM10). In this particular case, the measured gases and particles are harmful to human health (Li and Yang, 2016, p. 62). It is worth pointing out that air is primarily defined in relation to human health, while ecological sustainability or climate issues are not considered. PM2.5 is understood to be more harmful to human health compared to the other pollutants (Li and Yang, 2016), and it is also the particle most widely discussed among microbloggers. None of the other gases or

particles is mentioned by name by microbloggers; air pollution is primarily identified in relation to PM2.5.

Aside from scientific knowledge systems, AQIs are intertwined with political decisions on how to convert measurements to scales of danger. The Chinese measurements are regulated by the government-approved “Ambient Air Quality Standards” (Rohde and Muller, 2015), and guidelines from the Ministry of Environmental Protection further stipulate how to convert the density of pollutants to an AQI value (MEP, 2012). As conversion is implemented according to national regulations, users need to be familiar with the national scale to estimate the exact density. In China, apps display information from both Chinese and American stations. Yet, an AQI value does not convey the same density of a specific element, since danger and harm are assessed differently (Andrews, 2014). The Chinese index is more lenient than the American one (Andrews, 2014; Qiao *et al.*, 2015). In regard to PM2.5, Table I shows that the two countries agree on similar AQI values only when PM2.5 reaches over 150  $\mu\text{g}/\text{m}^3$ .

In other words, an AQI value hides the underlying classification system, such as the political decisions behind the values. Yet, it is the perceived transparency of numbers that has made them a preferred mode of representation of scientific facts, as Poovey (1998) points out in her historical account of how numbers have come to epitomize the modern scientific fact. Although Poovey’s research focuses on a western historical context, her more general insights are clearly relevant for this study. Numbers seemingly offer transparency, yet hide the rationale behind the display; they embody ideas of how and what to count, as the study of AQI values makes evident. The salience of numbers as undisputed facts is also manifest on Sina Weibo, and only a few microbloggers seem aware of the underlying information system which the air quality app is part of. A woman writes: “today, the PM2.5 density is 56  $\mu\text{g}/\text{m}^3$ .” By indicating the density, she gives the reader free rein to convert to a preferred AQI index. This precision is uncommon, and microbloggers generally write a number without specifying if it is the measured density of a gas, the AQI value of PM2.5, or a congregated AQI number. The tacit agreement seems to be that the higher a number, the worse the smog. And for most accounts and purposes, this is a reasonable connection to make.

*Relativizing air pollution: air quality ranking*

Numbers can be ordered in hierarchies, facilitating comparisons (Poovey, 1998, p. 54). This phenomenon can be seen on social media, where ranking has become a popular mode of engagement. According to Scott and Orlikowski (2012), online ranking has created a process of commensuration, whereby different entities are compared by the same metric. On Sina Weibo, the air quality apps provide users with national and international lists of the best and worst air based on the AQI metric. This function is popular amongst microbloggers, as the frequently posted screenshots reveal. In a screenshot showing the most polluted cities in the world for a particular day, Shijiazhuang is number one.

| AQI value (PM2.5) | China (PM2.5)         | USA (PM2.5)              |
|-------------------|-----------------------|--------------------------|
| 0-50              | 0-35 $\mu\text{m}$    | 0-12,4 $\mu\text{m}$     |
| 50-100            | 35-75 $\mu\text{m}$   | 12.5-35.4 $\mu\text{m}$  |
| 100-150           | 75-115 $\mu\text{m}$  | 35.5-55.4 $\mu\text{m}$  |
| 150-200           | 115-150 $\mu\text{m}$ | 55.5-150.4 $\mu\text{m}$ |
| 200-300           | 150-250 $\mu\text{m}$ | 150.5-250 $\mu\text{m}$  |
| > 300             | > 250 $\mu\text{m}$   | > 250.5 $\mu\text{m}$    |

**Sources:** Andrews (2014); MEP (2012)

**Table I.**  
Comparison of national conversion tables from China and USA



A microblogger writes ironically: “Think of how many cities there are in the world, and our Shijiazhuang manages to be the most polluted city of them all! That is difficult.” Another day, a woman exclaims:

I don’t understand how the air quality in Kaifeng can be so bad! When it’s overcast, it’s smoggy; when it’s cold, it’s smoggy; even when the sky is supposed to be clear, it’s smoggy. This morning, Kaifeng is the third most polluted city in China. PM2.5 is over 300! I don’t even dare to put my washed clothes out to dry. Was the good air of Kaifeng only a dream?

Hitting the top spot in the list generates anxiety for the microbloggers who happen to live in that city. A microblogger from Chengdu posts a screenshot of the national ranking list and writes: “This is all too worrying. Unexpectedly in top 5. I wonder if there is a difference between the world outside the window and apocalypse.” Air quality lists also generate relief, as microbloggers discover that there are worse places than their hometown or better places to move to. A woman from Beijing writes: “The smog in Xuzhou is unexpectedly worse than in Beijing.” A fellow Beijinger is not as optimistic and contemplates buying a house on Hainan to serve as a weekend escape because “the air is so much better there.” In Changsha, a man reasons that the air is not worse than in Shijiazhuang, and, even better, the house prices are lower. Furthermore, the tendency to compare air pollution and places is present in the daily news flows on Sina Weibo, where the air pollution in India compares unfavorably to the air pollution in China. During the time of material collection, such news featured as hot topics over a long period, making it virtually impossible for microbloggers to miss.

It has been pointed out that ranking is a specific feature of socio-materialist relations: without the material basis, ranking is harder to accomplish and popularize (Pollock, 2012; Scott and Orlikowski, 2012). While ranking can be seen as an active process, where users are co-creators of the rankings (Scott and Orlikowski, 2012), in the case of air quality apps, they are relatively fixed and users have few possibilities to “create” a ranking. The type of ranking is nevertheless one mode that can be regulated, and our material manifests that users prefer national rankings. This stands in contrast to media outlets, which prefer to highlight China’s position in relation to international rankings.

The use of numbers makes quantity a privileged measure (Poovey, 1998), but using quantity as a metric in environmental matters risks overlooking other environmental qualities (Verran, 2012, p. 112). Through AQI numbers and subsequent rankings, air pollution becomes a phenomenon that can be compared and quantified, which may contribute to a hierarchical perception of air pollution. Other definitions of air, such as evaluations based on feelings and experiences, are pushed to the background, as one metric, the AQI, dominates. Moreover, discussions are centered on comparisons, whereas the causes of air pollution are overlooked. The role of numbers and, by extension, air quality apps is interesting, as such functions encourage users to look at air pollution from the perspective of the present. The apps neither provide contextual knowledge of air pollution, nor do they deepen the understanding of what causes air pollution in the first place. Rather, they center the attention on ranking, but do not illustrate how the top spot on the list could be avoided.

#### *Avoiding air pollution: going on vacation, staying inside and driving cars*

Aside from hidden information structures, air quality apps openly encourage and promote certain practices and understandings. Different esthetic functions, for example, color schemes, communicate the dangers of high numbers. Low values are colored in green, yellow, or orange, and higher values range from red to purple and maroon (Figure 1). As aesthetic functions of objects carry symbolic meanings (Shove *et al.*, 2007, p. 108), this particular color scheme shares the symbolism of traffic lights: green indicates permission and red danger. Some apps also use images and texts to guide the viewer such as facemasks

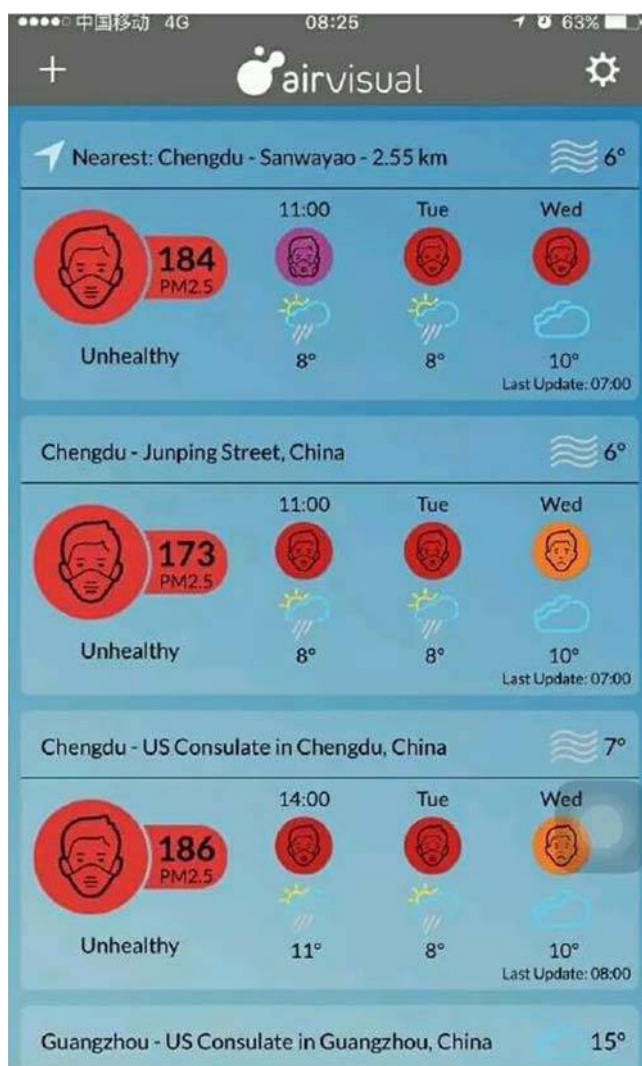
| 监测点位       | PM2.5 | PM10 | AQI | 空气质量等级 |
|------------|-------|------|-----|--------|
| 大理道(和平)    | 298   | 449  | 348 | 严重污染   |
| 前进道(河西)    | 332   | 574  | 474 | 严重污染   |
| 宾水西道(南开)   | 299   | 428  | 349 | 严重污染   |
| 大直沽八号路(河东) | 316   | 538  | 438 | 严重污染   |
| 中山北路(河北)   | 369   | 524  | 424 | 严重污染   |
| 勤俭道(红桥)    | 345   | 465  | 395 | 严重污染   |
| 跃进路(东丽)    | 318   | 520  | 420 | 严重污染   |
| 航天路(东丽)    | 311   | 473  | 366 | 严重污染   |
| 津沽路(津南)    | /     | 550  | 450 | 严重污染   |
| 辛老路(西青)    | 326   | 398  | 376 | 严重污染   |
| 海泰发展二路(西青) | 352   | 462  | 401 | 严重污染   |
| 淮河道(北辰)    | 346   | 487  | 396 | 严重污染   |
| 营口道(塘沽)    | 204   | 366  | 254 | 重度污染   |
| 第四大街(塘沽)   | 214   | 332  | 264 | 重度污染   |
| 汉北路(汉沽)    | 228   | 480  | 375 | 严重污染   |
| 河西一经路(汉沽)  | 219   | 437  | 321 | 严重污染   |
| 永明路(大港)    | 208   | 351  | 258 | 重度污染   |
| 雍阳西道(武清)   | 141   | 206  | 187 | 中度污染   |
| 天和路(武清)    | 279   | 313  | 329 | 严重污染   |
| 渔阳路(宝坻)    | 253   | /    | 303 | 严重污染   |
| 宝白公路(宝坻)   | 371   | /    | 414 | 严重污染   |
| 团泊洼(静海)    | 260   | 332  | 310 | 严重污染   |
| 广海道(静海)    | 244   | 379  | 294 | 重度污染   |

Source: Screenshot by Carin Graminius

Figure 1.  
Color coding  
and AQI values

(Figure 2) or texts advising the user to stay inside (Figure 3). The air quality apps are not only part of an underlying information system intersecting with political and scientific decisions. The app itself visually encourages certain activities; it relates other objects and ideas to the understanding of air pollution, creating a nexus of interrelated elements. Configurations and clusters of interrelated elements carry ideas (Shove *et al.*, 2012), and the design of air quality apps together with an underlying information structure indirectly shift the focus away from human actions that are causing the hazardous air, and instead it reframes the question of air pollution to narrowly focus on health protection and avoidance of air. At the same time, apps do not simply determine behavior. Rather it is the configurations of different elements that make up a practice (Schatzki, 2001b; Shove *et al.*, 2012). In this case, air quality apps constitute one element out of many. Yet, in configurations with other elements that speak of similar issues, the inbuilt predilections of apps become increasingly potent.

On Sina Weibo, activities of avoidance constitute elements entering into configurative relationships with air quality apps. Vacationing in an environment with clean air is one of these activities. Microblog posts reveal that people have fled the smog in search for blue sky.



Source: Screenshot by Carin Graminius

Figure 2.  
Example of an  
air quality app

A woman writes: “Swapped Beijing’s smog for this sunny and warm city. It feels like I live in two worlds [...]” Two pictures captioned “Hainan” showing blue skies and lush parks accompany her text. People that cannot take time off from work to escape the bad air reminisce about past vacations:

I looked at these pictures, and saliva started dripping. Ah, I want to go to the desert and breathe fresh air again! The smog is here!!! I have air purifiers on in every room at home. When I go outdoors, I wear face masks. But there aren’t any air purifiers at work!!! Really uncomfortable.

The microblogger has posted a series of pictures showing sand dunes, blue sky, and two people smiling toward the camera.



**Figure 3.**  
Example of an  
air quality app

**Source:** Screenshot by Carin Graminius

Staying inside is another recurring expression of avoidance. It is manifest in pictures where people look out of the gray window, seemingly captive indoors. Worried mothers tell stories of having to keep their children inside with pictures of their toddlers engaging in indoor activities and looking bored. A day when the smog partly dispersed, a mother from Henan microblogged:

Mothers, spring has arrived, maybe you look at it with mixed feelings? The happy news are that our babies, who have been captured inside like cats to avoid the smog of the winter, can finally go out and breath, get a chance to grow [...].

To avoid the air, many microbloggers use the car. A microblogger states that “the air is bad today, so I will take the car to work.” There are images taken from car windows on congested roads and gray air, and people express relief about being inside the cars and not outside.






Some of these avoidance strategies may increase air pollution levels, for instance, air travels to destinations with better air and a preference for driving if the air is “bad.” However, these activities follow the logic of several interconnected elements, which, in different ways, encourage the idea of avoidance. The overall message that fellow microbloggers thereby encounter by daily exposure to Sina Weibo is a focus on health protection and avoidance.

One can thus argue that, although general censorship issues may silence open criticism of how the government treats the problem of air pollution and hide citizens’ likely frustration with the government’s failures to prevent air pollution, the design of the apps, and the everyday narratives of escape and avoidance also help to direct attention away from governmental and individual responsibility to prevent air pollution.

### *Battling air pollution with the weather*

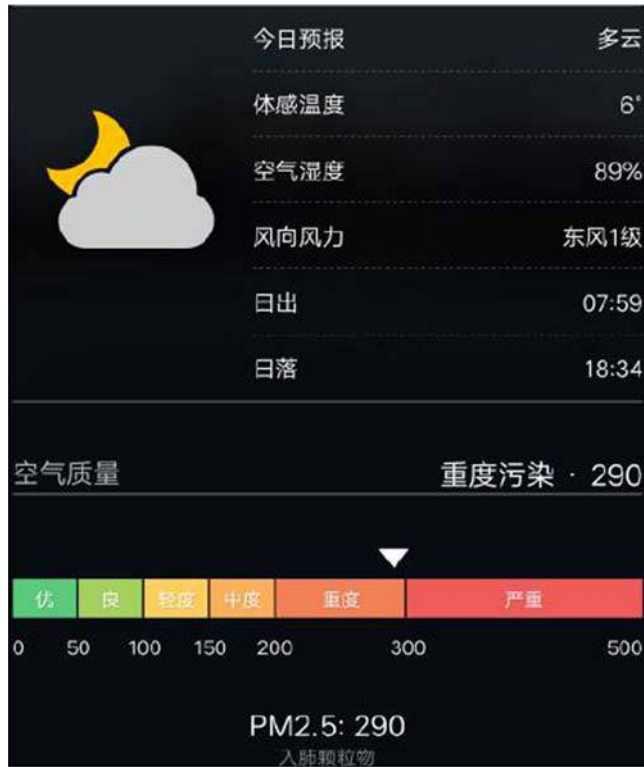
As human agency is directed toward avoidance, agency to deal with air pollution is frequently attributed to natural phenomena, such as the wind and rain. Digital objects and activities, such as air quality apps, weather apps, and weather reporting, contribute to promoting such understandings. The everyday flows from news agencies and municipal environmental bureaus invariably consist of weather forecasts announcing the current weather and its effect on the air quality. As wind directions and precipitation affect the density of pollutants and their location, the weather forecasts underscore the relation between “weather phenomena” and air pollution. This connection is also manifest in screenshots and texts from private microblogs. Figure 4, a screenshot of an air quality app, shows the wind force, wind direction, humidity, and the AQI value for PM2.5. Like weather forecasts, the apps connect weather and air pollution.

From one perspective, the display of meteorological phenomena together with AQI values is meaningful, as wind force, wind direction, and humidity can disperse the smog (Rohde and Muller, 2015). However, the connection between air pollution and weather seemingly contributes to the idea of air pollution as a natural phenomenon, which occurs when meteorological conditions are inauspicious. A man from Shandong writes: “In the north of China, no matter how serious the air pollution, we only need a northern wind, and the sky immediately turns blue.” In Beijing, microbloggers have been waiting for the wind and are finally rewarded: “Yesterday a strong wind cleaned Beijing and Hebei from the smog.” A fellow Beijinger playfully sums up the experience in these words:

 dispersed the smog and brought  We thank  We worship and praise  Is this called superstition ?

Snow and rain are also appreciated weather forces. “The smog dispersed after the rainfall. Chengdu is beautiful as far as the eye can see,” a woman writes. A man from Henan describes at length how he appreciates the snow that has fallen this day in February. Another day, a fellow Henanese microblogger longs for rain: “To make the skies of the cities blue again, we have to wait for the wind and rely on the rain. The environmental protection bureau can’t do a thing.” Displayed in these examples is the perception of smog as intersecting with the idea of natural meteorological forces beyond human control.

In the practice theory, clusters of activities are seen to form practices (Schatzki, 2001b); a change of activities may change or dissolve the practice (Shove *et al.*, 2012). Thinking of the weather report as consisting of clusters of activities can help to explain the conflation between weather and pollution. Announcing the air quality, an activity that is generally related to environmental protection has been incorporated into weather reporting. A fusion



Source: Screenshot by Carin Graminius

Figure 4.  
Example of an  
air quality app

of different sets of activities has occurred. This has implications for the perception of air pollution: smog partly appears as a consequence of adverse weather conditions, while human activities causing air pollution in the first place are rendered invisible. The fusion of activities is not only manifest in weather forecasts, but also in air quality apps and weather apps. Furthermore, the configuration of these activities is disseminated in the form of screenshots by microbloggers who use these apps.

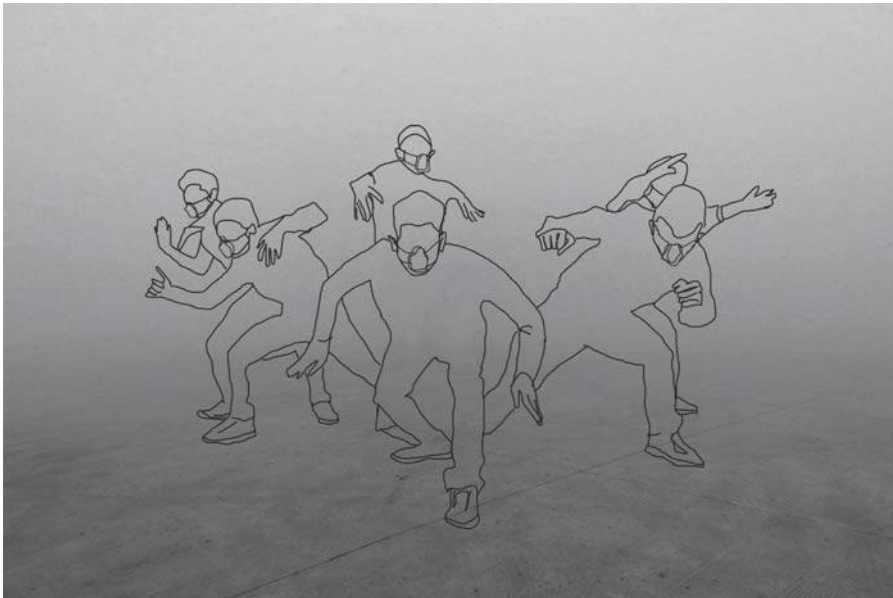
#### *The facemask: protection and contention*

Meaning and perceptions are shaped in configurations with different elements, which defy the notions of material determinism (Marres, 2012; Woolgar and Neyland, 2013). In our study, facemasks are a good example of the ongoing configurations of various elements and the interchangeability of meaning. On Sina Weibo, facemasks are mentioned in texts, images, and through emojis 🧴; it is an item which users take for granted in “airpocalypse,” and it is also promoted in air quality apps, news media, advertisements, and microblogs. Facemask selfies flick past the viewer: people wear them while walking, biking, and taking the subway[5]. The absence of facemasks is also recorded, with selfies against the blue sky and fingers in a V-sign in front of the face. Apart from esthetic inconveniences, their usefulness seems undisputed. A woman from Beijing posts a picture of two facemasks – one gray, one white, unused – with the caption: “used one day.” The way facemasks are used and discussed indicates that people consider air pollution hazardous, and that facemasks provide some protection. Images and texts indicate that it has become an integral

part of everyday life, an extension of the body which is noticed when absent, as the celebratory V-signs selfies suggest. The characteristics of the facemask as an object of protection and avoidance are reinforced by the pairing of specific elements, such as air quality apps and digital flows of news and advertisements encouraging such usage.

As relationships between elements change, the status and meaning of an object can change (Marres, 2012; Woolgar and Neyland, 2013). For instance, in the context of recycling, “waste” can change status to become a symbol of environmental concerns (Woolgar and Neyland, 2013). In a few posted images and videos, the facemask is subtly used to materialize demands for a better environment. Such posts differ from the everyday snapshots encountered on Sina Weibo by their aesthetics. In one microblog video (Plate 1), a dance group performs what they call “the smog dance,” wearing facemasks against the backdrop of the hazy skyline. The background music features breathing noises, and the dance itself includes movements where the dancers supposedly “choke.”

In another image consisting of nine portraits, people wear facemasks while staring fiercely into the camera. Characters printed in red announce: “I live in [xx], I want to breathe.” In this context, the facemask is used to shed light on the hazardous conditions people live in. While it still helps people to avoid the air, it turns the viewer’s attention to the hazardous air. Contrary to the normalization of the facemask as a neutral component of protection in everyday life, the aesthetics, activities, and digital presentation make facemasks into a symbol of suffering; it is a call for change. Thus, the ontological status of facemasks changes in different constellations of elements – it is a normalized everyday object of protection that encourages avoidance of the air and a carrier of questions related to suffering and demands for better air. With digital technology, digital platforms, and creative esthetics, facemasks can be – and are – made into informational objects of contention.



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**Plate 1.**  
Interpretation of a  
scene from “The Smog  
Dance”

### The digital materiality of air pollution

In order to create a sustainable society, researchers need to understand how unsustainable practices are sustained (Pink, 2012). An integrated information system pays attention to different elements and their subsequent interrelationships (Shove *et al.*, 2012), enabling a study of practices and the elements that sustain them. We asked what types of elements are central in shaping understandings of air pollution online, and this study shows how perceptions of air pollution among microbloggers evolve in configurations of everyday elements such as air quality apps, facemasks, and activities of avoidance and comparisons. Furthermore, fusions of elements mix practices with each other, further shaping perceptions of air pollution. The perceptions these configurations contribute to forming are arguably not conducive to improving the air quality. Humans are pictured as passive receivers of hazardous air, and agency to improve the situation is instead deferred to natural forces such as the wind and the rain. As the Chinese authorities have taken measures to improve the air quality (Shapiro, 2016) and pushed for the creation of an eco-civilization (Ma, 2015b), it is interesting that several objects, activities, and perceptions of air pollution that figure online on an everyday basis do not encourage human agency. This raises questions about how sustainable practices and perceptions can be encouraged. Given citizens' willingness to commit to environmental improvement (Jiang *et al.*, 2017), government agencies may benefit from paying closer attention to everyday settings, mundane objects, and media representations that encourage, instead of discourage, environmental agency.

Sina Weibo is a medium that influences the representations of air pollution that figure on the site. Political restrictions and censorship may, for instance, contribute to the lack of representations of human collective action against air pollution as well as open criticism of the government's response to air pollution (Yang, 2008). Yet, whereas political restrictions and internet control may discourage microbloggers from publishing posts on organized mass actions or political critique, the government actively encourages responsibility and awareness centered on sustainable lifestyles (UNEP, 2016, p. 18). Thus, in practice, there are no political obstacles to posting messages about selling one's car for ecological reasons, instead of posts about the need to drive due to deteriorated air. This is precisely where practice theory enters our analysis, as it illustrates how configurations of mundane objects and activities influence perceptions of air pollution and make certain activities, such as driving cars, more likely to happen than others. As studies of environmental perception in the West have shown, interlocutors are influenced by artefacts and elements in the immediate environment (Haider, 2011, 2016; Marres, 2012). Our study shows that the visual and sensory presence of smog in Chinese citizens' lives does not necessarily condition environmentally sensitive behavior; instead, socio-materialist enactments play a role in creating practices and perceptions of air pollution.

Digital devices play a dominant role in representing air pollution. It is noticeable that the most common objects circulating on Sina Weibo – the air quality apps – are constructed for online use. In contrast to facemasks, whose online existence happens through representations, the apps only exist digitally. The digital character of Sina Weibo and its inbuilt possibilities and constraints influence the type of objects encountered on the site. It is relatively easy to take a screenshot of an application and post it on Sina Weibo in order to say something about air pollution. Thus, a digital materiality – such as the possibilities built into the devices for taking screenshots and sharing them on pre-defined applications – is a prominent aspect of air pollution.

boyd (2008) suggests that the internet needs to be conceptualized as a place which affects our life both online and offline. Likewise, air pollution is experienced physically and digitally, as the air quality apps are part of microbloggers' daily exposure to air pollution. Air pollution becomes a digital and physical phenomenon, whose related practices are shaped by events in physical and digital space. A screenshot from an app shared on Sina



Weibo represents a physical experience of the smog. The ranking functions of the air quality apps are mirrored in physical space when microbloggers choose vacation destinations or contemplate moving. Measures of protection, which the air quality apps indirectly promote, are manifested in the use of facemasks or the preference for car driving. Interconnected chains of elements form practices related to air pollution, which span over digital and physical space, creating a story of life in airpocalypse.

### Notes

1. The majority of internet users in China are under 44 and hold a high school diploma or a university degree (Dunahee and Lebo, 2016, pp. 27-28). Only 27.9 percent of China's internet users live in rural areas (Svensson, 2014, p. 173).
2. External and internal internet traffic is controlled through a gateway by the Chinese Ministry of Industry and Information Technology (Yang, 2008, pp. 48-50). Yet, how the traffic is regulated and if it affects searches on Sina Weibo is not clear. This study was conducted using a Swedish IP address.
3. At present, the measure stations are located in urban areas. In 2015, there were air quality measure stations in 367 cities (Liu, 2016).
4. The American embassy and consulates measure the air in Beijing, Shanghai, Chengdu, Shenyang, and Guangzhou (US Embassy, China, 2017).
5. The facemasks designed for pollution and not the hospital facemasks used on trains to avoid bacteria.

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